

# Sample Pubrica dissertation—statistical analysis and interpretation

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*This sample document covers the following:*

1. Reliability analysis
2. Factor analysis
3. Regression
4. Independent sample-t-test
5. Correlation
6. Mediation analysis

The results and analysis of the quantitative which have been collected from the questionnaires. The data was first entered into Excel files and then exported into SPSS software (IBM Corp. version 21.0, NY: IBM Corp). Thus, using SPSS software the present study results were analyzed. Missing data, outliers and logical checks were performed at first level. Accuracy of the data was checked by proof reading the questionnaires against the SPSS data window. Using the descriptive statistics mode of SPSS frequencies were calculated for the categorical variables. Reliability analysis was used to find out how reliable the multi-item scale using Cronbach's alpha. Factor analysis is used to determine the underlying dimensions of multi-item measurement scales use. For the given hypothesis tests were performed using the Correlation and regression analysis was used to compare the dependent/Independent variables with the grouping variables were performed. To perform the mediation analysis the study would adopt Sobel's test. P <0.05 was considered significant.

## Reliability of the factors

Factors	No. of items	Cronbach's Alpha
<b>(I) Performance Expectancy (PE)</b>		
Perceived Usefulness	7	0.762
Interactivity	3	0.512
Flexibility	4	0.639
<b>(II) Effort Expectancy (EE)</b>		
Ease of learning	3	0.731
Ease of use	5	0.769
Self-efficacy	4	0.714
<b>(III) Social Influence (SI)</b>		
Subjective Norm	3	0.652
Image	3	0.707
<b>(IV) Facilitating Conditions (FC)</b>		
ICT Infrastructure	3	0.719
Institutional Policies	3	0.697
Training and Technical Support	3	0.624
Leadership	3	0.644
<b>(V) Blended Learning (BL)</b>		
Behavioural Intention	3	0.655
Actual Usage	2	0.750
<b>(VI) students Learning Style</b>		
Dependent	10	0.813
Competitive	10	0.802
Independent	10	0.838
Collaborative	10	0.871
Participant	10	0.822
Avoidant	10	0.821

The reliability measures of factors on blended learning perceived by the students. This table shows the presents the Blended learning having six factors such as dependent, competitive, independent, collaborative, participant, avoidant and its Cronbach's alpha ranges from 0.512 - 0.87. The values in the range show that the items in the factors are highly relevant and sensitive to measure the factors in the questionnaire and also it is found for the main study.

## Exploratory Factor Analysis (EFA)

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.479
	Approx. Chi-Square	62269.667
Bartlett's Test of Sphericity	Df	1176
	Sig.	.000

The Kaiser-Meyer-Olkin measure of sampling adequacy was .48, below the recommended value of .6, and Bartlett's test of sphericity was significant ( $\chi^2(1176) = 62269.7$ ,  $p < 0.05$ ). High values (close to 1.0) generally indicate that a factor analysis may be useful with your data. If the value is less than 0.50, the results of the factor analysis probably won't be very useful. Bartlett's test of sphericity tests the hypothesis that your correlation matrix is an identity matrix, which would indicate that your variables are unrelated and therefore unsuitable for structure detection. Small values (less than 0.05) of the significance level indicate that a factor analysis may be useful with your data.

The identified variables were classified under the appropriate group. 42 variables have emerged into 6 major factors. The factors are:

- I. PERCEIVED USEFULNESS (PU)
- II. FACILITATING CONDITIONS (FC)
- III. EFFORT EXPECTANCY (EE)
- IV. BEHAVIORAL INTENTION (BI)
- V. ACTUAL USAGE (AU)
- VI. SOCIAL INFLUENCE (SI)

### Rotated Component Matrix

Factors	Factors						% variance explained
	1	2	3	4	5	6	
ELearning allows me to get information from online resources (e.g. Wikipedia, Internet search engine).	.815						25.09
Using eLearning, I can interact with the teacher and get answers to my questions in reasonable time.	.760						
Using eLearning reduces my study load considerably.	.708						
Using eLearning increases my chance of scoring higher marks.	.636						
Using eLearning enhances my efficiency as a student.	.613						
Using eLearning in studies enables me to accomplish tasks	.607						
Using eLearning helps me to learn the topic.	.582						
Using eLearning increases the number of topics I can study per day.	.567						
ELearning enables me to learn lessons in the form that is adapted to my learning style.	.558						
ELearning enables me to learn at my pace.	.553						
ELearning provides me the flexibility of studying the topic anytime, at any place.	.534						
I find eLearning useful in my studies.	.483						
Using eLearning allows me to interact with friends and work together on assignments.	.475						
Using eLearning allows me to choose topics to learn in order of my preference.	.462						
My institute has provided me all the facilities I need for eLearning.		.769					34.15
The head of my department/ institute supports students using eLearning.		.743					
There is technical help available if required while using eLearning.		.700					
My Institute has infrastructure that support eLearning		.688					
The ICT infrastructure at my institute is available when I need it.		.683					
My institute provides incentives to students who use eLearning.		.611					
My institute provide facility to use eLearning tools		.574					

The head of my department/ institute uses eLearning.	.544						41.98
My institute provides me an opportunity for eLearning	.504						
The head encourages me to us eLearning	.456						
My institutes provides incentives to teachers who use eLearning	.382						
My institute has provided training for me to use eLearning tools	.356						
Learning to operate eLearning tools is easy for me	.812						48.37
Most of my teachers possess the skills to use eLearning.	.777						
I use eLearning, if I have just the built-in help facility for assistance.	.676						
It is easy for me to become skilful at using eLearning	.657						
It is easy for me to become competent at using eLearning	.556						
I find eLearning easy to use.	.523						53.84
My interaction with eLearning is clear and understandable	.463						
Using eLearning requires a lot of mental effort.	.377						
Learning to use eLearning tools is easy for me.	.355						
I find it easy to get eLearning to do what I want to do.	.285						
I use eLearning, if I have a lot of time to complete the job for which the software is provided.	.256						58.45
I possess the skills necessary to use eLearning tools.	.226						
I intend to use eLearning in the next semester.	.742						
I plan to use eLearning in the next semester.	.720						
I predict I would use eLearning in the next semester	.671						
What are the different features of eLearning (across tools) you use? List in the order of frequency of usage					.798		58.45
Which eLearning tools do you use? List at least three in the order of frequency of usage					.790		
Most people who influence my behaviour (teachers, colleagues, and head of the department/institute) want me to use eLearning						.773	
Professor in my class have been helpful in the use of eLearning						.644	

In my institution, students who use eLearning have more prestige than those who do not					.617	
Most people who are important to me want me to use eLearning as much as possible					.453	
Using eLearning adds to my status amongst my colleagues					.445	
Students in my organization who use eLearning are considered to be smart					.335	

Fourteen items with inputs were loaded under Factor one with loading ranging from 0.82 to 0.46. Hence it is named as Perceived usefulness.

Twelve items were loaded under Factor Two with loading ranging from 0.77 to 0.36. Hence it is named as facilitating conditions.

Twelve items were loaded under Factor Three with ranging from 0.81 to 0.23. This was effort expectancy.

Three items loaded under Factor Four with ranging from 0.74 to 0.67. These items are under behavioral intention.

Two items loaded under Factor Five with ranging from 0.80 to 0.79. These items are under actual usage.

Six items loaded under Factor Six with ranging from 0.77 to 0.34. These items are under Social influence.

The above table presents the results of the factor analysis and a detailed description of each item for each of the six main factors. All the factors accounted for 25-58% of the variance.

## Regression Analysis

Multiple regression analysis is similar to the linear regression analysis. In the linear regression, we have to use only one independent variable and dependent variable. But in the multiple regressions, we can to use more than one independent variable and one dependent variable. Both regression analyses are used to predict the value of a dependent variable based on the value of independent variable. Dependent (Predictand) variable means the variable we want to predict and independent variable means the variable we are using to predict the value of the dependent variable.

- R square ( $R^2$ ) value explains what percent of variance in the dependent variable that can be explained by the independent variable.

- F-ratio in the ANOVA table tells whether the overall regression model is a good fit or not for the data.
- Estimated model coefficients table contains the following estimators: Through t-value and p-value for each independent variable, we can know whether each independent variable is significantly predicting the dependent variable. Beta ( $\beta$ ) coefficients are the point estimator of independent variables. This table also contains the interval estimator of independent variable.

### **Students Users Acceptance of Technology and its influence on blended learning adoption**

***H<sub>5</sub>: Performance Expectancy of students has significant influence on blended learning adoption***

#### **Association between Behavioral intention and performance expectancy**

	Unstandardized Coefficients		R-Square	t-value	P-value
	Beta	SE			
(Constant)	1.016	0.122	0.428	8.322	0.000
Performance expectancy	0.821	0.033		25.035	<b>0.000**</b>

Dependent Variable: Behavioural Intention, \*\*p<0.01

**H<sub>5</sub>** postulated that the performance expectancy of students has significant influence towards the adoption of blended learning. It is evident from the above table that the student believe that using the system would enhance the academic performance and this perception was found to be positively influenced through the use of technology. The beta coefficient of the regression for dependent variable of Behavioural Intention on the independent variable of Performance Expectancy is found to be significant at 0.01 level ( $\beta=0.821, t=25.035, p<0.001$ ). Further the R-square value of 0.428 indicates 43% of variation explained by the independent variable of Performance Expectancy to Behavioural Intention (Dependent variable). Hence, the proposed hypothesis

**H<sub>5</sub>: Performance Expectancy of students has significant influence on blended learning adoption" is accepted.**

#### **Independent sample t-test**

Independent sample t test is used to find out whether the mean of two unrelated groups (independent variable) are equal or not based on the same dependent variable. The data should be in the following format.

- Independent variable must be in categorical data
- Dependent variable should be measured on a continuous scale (interval or ratio)
- The data should contain without outliers. Outlier means a value(s) which is deviate from the whole data.
- The data should follow approximately normally distributed for each of the group of independent variable.
- The variability within the independent variable is not distinct.

F-value and p-value for Levene's test are used to test the homogeneity of variances within two group of independent variable. Here p-value must be greater than 0.05, then we conclude that the two groups' variance are same.

Descriptive statistic (Mean, SD and SE) for two groups based on the dependent variable.

t-value and p-value for t test are used for compare the mean of two groups based on dependent variable.

### Student's Demographic factors on Learning Style

*H<sub>12a</sub>: Gender significantly influences on the learning style of students*

Mean difference between Male and Female on learning style of students

Variables	Gender		t-value	P-value
	Male (n=548)	Female (n=293)		
Dependent	4.30±0.49	4.11±0.53	5.357	<b>0.000**</b>
Competitive	4.54±0.30	4.47±0.27	3.198	<b>0.001**</b>
Independent	4.08±0.65	3.93±0.76	2.999	<b>0.003**</b>
Collaborative	4.17±0.73	4.01±0.75	2.937	<b>0.003**</b>
Participant	4.86±0.26	4.85±0.27	0.326	0.744
Avoidant	4.01±0.67	3.90±0.67	2.130	<b>0.033*</b>

\*\*P<0.01, \*P<0.05

H<sub>12a</sub> postulated that the gender significantly influences on the factors of learning style of students. Thus, it is clear from the above table that gender construct yielded a significant and positive effect on learning style of students. . The obtained t-value of 5.357 for Dependent found to be significant at 0.01 levels. Similarly it is found for the variable of Competitive (3.198), Independent

(2.999), Collaborative (2.937) and Avoidant (2.130). All the variables were found to be significant at 0.05 levels.

Further inspection of the table shows that the male group have scored higher mean values on all the variables of learning style of students than female group. Hence the proposed hypothesis

**H<sub>12a</sub>: Gender significantly influences on the learning style of students is accepted.**

### Correlation Analysis

The strength and direction of association between two variables are measured by Pearson correlation coefficient. The two variables must be measured on a continuous (interval) scale. The correlation coefficient ( $r$ ) ranges from -1 to 1. Based on the sign of the correlation coefficient we may conclude the following manner:

- If  $r_{x,y}$  is positive – The two variables X and Y are in positive relationship.
- If  $r_{x,y}$  is negative – The two variables are in negative relationship.
- If  $r_{x,y} = 0$ , There is no relationship between X & Y

Significance (p) value is used to whether the two variables are in relationship or not.

Correlation coefficient ( $r$ ) value is used to find out whether the two variables are positively relationship or negative relationship.

**H<sub>15</sub>: There is a significant relationship between the factors of teaching style and learning style of students**

## Correlation between teaching style of teachers and learning style of students

Factors	Dependent Competitiv e	Independen t	Collaborati ve	Participant	Avoidant	Expert	Formal authority	Personal Model	Facilitator	Delegator	
<b>Dependent</b>	1	.042	-.009	.005	.023	.054	.153	.159	.073	-.104	-.062
<b>Competitive</b>		1	-.021	.007	.006	-.044	-.100	.016	.133	-.076	-.120
<b>Independent</b>			1	.132**	-.073*	-.043	.246	.369*	-.017	.472**	.071
<b>Collaborative</b>				1	-.079*	.080*	-.334	-.226	.100	-.258	-.118
<b>Participant</b>					1	.035	.109	.049	.125	.090	.420*
<b>Avoidant</b>						1	.091	.122	-.341	.091	-.098
<b>Expert</b>							1	.666**	.471**	.191	.660**
<b>Formal authority</b>								1	.537**	.315	.377*
<b>Personal model</b>									1	.132	.405*
<b>Facilitator</b>										1	.243
<b>Delegator</b>											1

\*\*P<0.01, \*P<0.05.

The above table presents the Pearson correlation analysis. The correlation analysis shows the linearity between the variables not the strength of association between dependent and independent variables represented by r and p value, while r is degree of correlation and p signifies significance level. It is evident from the table that independent does showed a significant positive linear relationship with collaborative in particular ( $r = 0.132$ ,  $p < 0.01$ ), formal authority ( $r = 0.369$ ,  $p=0.04 < 0.05$ ), and facilitator ( $r = 0.472$ ,  $p < 0.01$ ). The correlation value ranged from 0.132-0.666. The correlation values are positive, mean when independent increases collaborative also increases. Hence there is relationship between teaching style of teachers and learning style of students.

### Mediation analysis

In mediation analysis contains three types of variables. Those are, (i) dependent variable, independent variable and mediating variable. Dependent variable means unobserved variable, independent variable means observed variable and finally mediating variable means it accounts for the relationship between dependent and independent variables. Mediation analyses can be used to test the effect of intervention.

***H<sub>17</sub>: The relationship between user acceptance of technology and behavioural intention is mediated by the learning style of students***

### (a) Performance Expectancy

Dependent variable: Behavioural Intention (Y; DV); Independent variable: Student Performance Expectancy (STPE; IV); (X); Mediator (MedV): Dependent, Competitive, Independent, Collaborative, Participant and Avoidant {Learning Style}

#### (1) Direct and Total Effects for Expert, Formal authority, Personal Model, Facilitator and Delegator

	Coefficients (SE)						t (p value, two tailed)					
	dep	comp	indep	colla	parti	Avoid	dep	comp	inde	colla	parti	Avoid
b <sub>YX</sub>	0.820 (0.033)	0.821 (0.033)	0.821 (0.033)	0.821 (0.033)	0.821 (0.033)	0.821 (0.033)	25.035 (0.000)	25.035 (0.000)	25.035 <b>(0.000)</b>	25.035 (0.000)	25.035 (0.000)	25.035 (0.000)
b <sub>MX</sub>	0.045 (0.024)	0.014 (0.014)	0.077 (0.033)	0.069 (0.035)	-0.037 (0.012)	0.093 (0.032)	1.892 (0.059)	1.023 (0.306)	2.377 <b>(0.018)</b>	1.986 (0.047)	-2.992 (0.003)	2.936 (0.003)
b(Y <sub>M.X</sub> )	0.083 (0.047)	0.177 (0.082)	-0.085 (0.035)	-0.014 (0.032)	0.019 (0.092)	0.005 (0.036)	1.761 (0.078)	2.169 (0.030)	-2.448 <b>(0.015)</b>	-0.419 (0.675)	0.212 (0.832)	0.128 (0.898)
b(Y <sub>X.M</sub> )	0.817 (0.033)	0.818 (0.033)	0.827 (0.033)	0.822 (0.033)	0.821 (0.033)	0.820 (0.033)	24.899 (0.000)	24.998 (0.000)	25.226 <b>(0.000)</b>	24.993 (0.000)	24.910 (0.000)	24.880 (0.000)

The above table shows the different paths such as IV to DV, IV to MedV, MedV to DV and IV to DV, after controlling for the MedV. The path of performance expectancy (STPE) to behavioural intention (BI), which is the total effect in this study, is found to be insignificant across the learning styles of students. However, the performance expectancy of students has a significant impact on learning style of student's especially independent style as all the four steps are significant and satisfied.

#### Indirect effect and significance using normal distribution

Mediators	Value	S.E	LL 95 CI	UL 95 CI	z	Sig.(two)
Dep	0.004	0.003	-0.002	0.009	1.2026	0.229
Comp	0.002	0.003	-0.003	0.008	0.854	0.393
Indep	-0.007	0.004	-0.014	0.001	-1.637	0.102
Colla	-0.001	0.003	-0.006	0.004	-0.368	0.713
Partici	-0.001	0.003	-0.008	0.004	-0.012	<b>0.006**</b>
Avoid	0.000	0.004	-0.007	0.007	0.121	0.904

The above table provides the test of the significance of the indirect effect using the Sobel Test. The indirect effect was presented for all the styles, which shows negative for all variables except dependent, competitive and avoidant and insignificant across the styles as shown by the p value except participant.

### Bootstrap result for indirect effects

Mediators	Mean	S.E	LL 95 CI	UL 95 CI	LL 99 CI	UL 99 CI
Dep	0.004	0.003	-0.001	0.012	-0.003	0.016
Comp	0.002	0.003	-0.002	0.010	-0.004	0.014
Indep	-0.007	0.004	-0.016	0.000	-0.021	0.001
Colla	-0.001	0.002	-0.006	0.004	-0.009	0.006
Partici	-0.001	0.003	-0.008	0.005	-0.012	0.007
Avoid	0.001	0.004	-0.008	0.008	-0.010	0.011

Finally, the output provides the bootstrapped confidence intervals (99 and 95 percentiles are calculated but the study would look at the 95%). Note that LL = Lower Limit (or the lower boundary) and UL = Upper Limit (or upper boundary) of the Confidence interval. Essentially in this study, the question posed was whether it is possible (with 95% confidence) that the TRUE indirect effect would be ZERO (basically, no mediation). In this table, majority of the values zero occurs between the LL and UL, thereby we can conclude that the indirect effect is insignificant. Therefore, it concluded that Sobel test condition is not true for learning style factors and thereby the hypothesis

$H_{17}$  is partially accepted which means, that the "The relationship between performance expectancy and behavioural intention is mediated by the independent learning style of students".

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